

ECHOGRAPH-BAPS

Ultrasonic Strip and Plate Inspection

KARL DEUTSCH

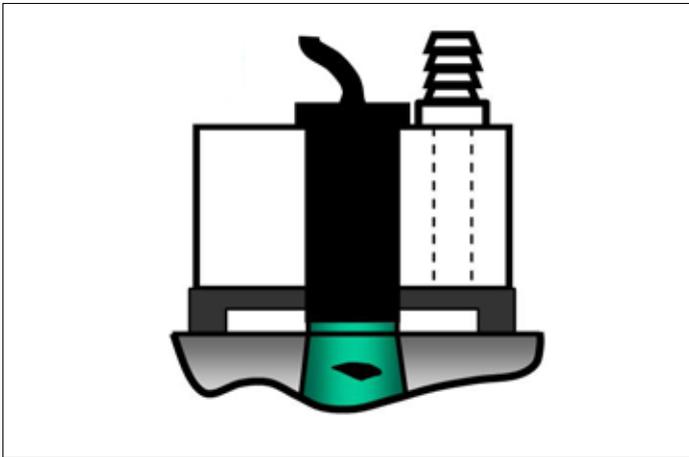
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KARL DEUTSCH has developed ultrasonic testing equipment since 1951 and has shipped the first strip inspection system more than 40 years ago. Many improvements on the ECHOGRAPH-electronics, the robust testing mechanics and the ultrasonic probes have led to our current state-of-the-art. KARL DEUTSCH maintains a strict quality management system according to DIN EN ISO 9001:2000.

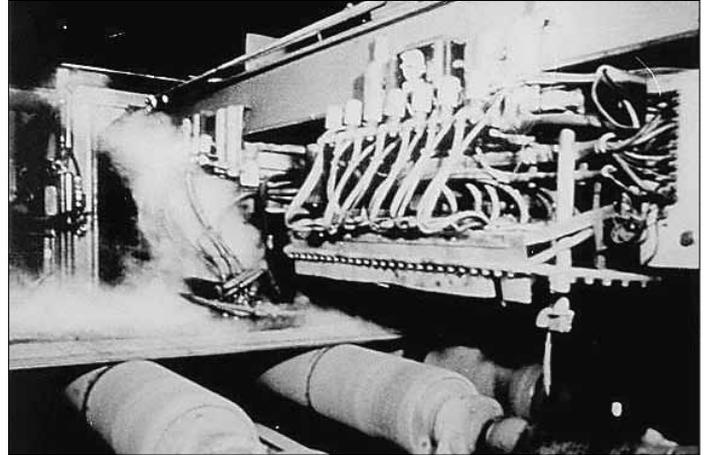
Many different probe configurations were realized so far: The inspection can be carried out in straight test traces or with an oscillating movement of the probes. The most common application is the pre-inspection of strips which are later used for the manufacturing of ERW- or SAW-pipes. The strips are welded together to obtain an endless strip. Within the production line the strip testing system is positioned before the strip is formed into a pipe. The testing speed corresponds to the welding speed of the pipe production, i.e. typically 0.1-0.3 m/s.



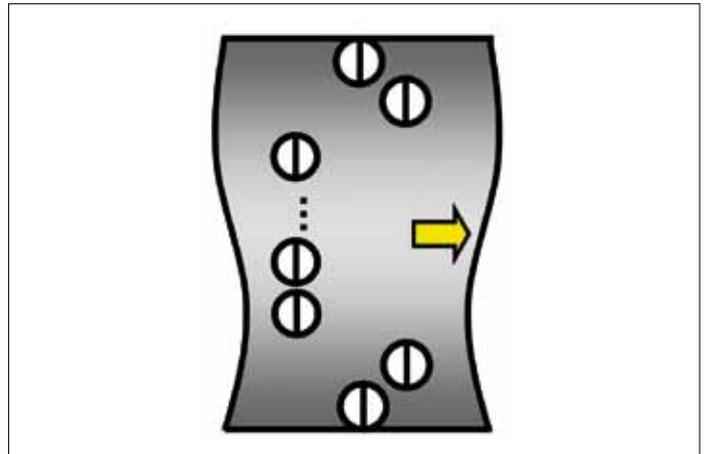
Water gap coupling:
The distance between probe and strip surface is approximately 0.3 mm. To detect defects close to both surfaces, dual-element probes are employed.



Special dual-element probes:
A wide test track of 25 mm is provided by each probe. A special composite piezoelectric material is used for a high testing sensitivity. The testing frequency is 4 MHz. The focus point should be optimized for the strip width. In this case, a focus point of 8 mm is used. Other probe types and / or housings are used in accordance with the application.



Historic strip testing system



Separate probe holders are used for the strip middle and the strip edge. While the strip middle requires an ultrasonic coverage of typically 25%, the strip edge is tested to 100%. The strip edge deserves higher attention, because they are close to the welding zone in a later stage of pipe production. Just recently, also some customers ask for full coverage for the strip middle. Thus, a large quantity of probes and electronic testing channels is required. As a rule of thumb, 25 mm of the strip width can be tested by one dual-element probe.

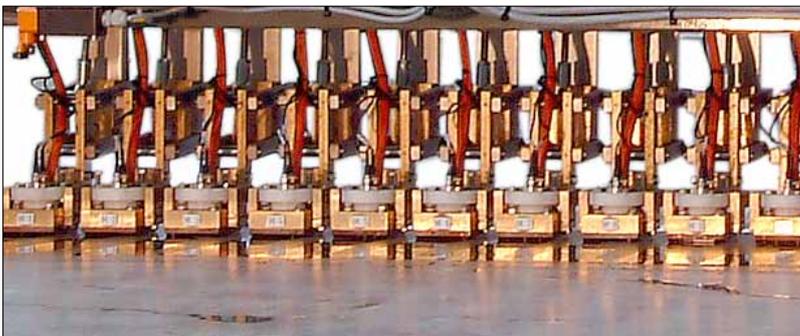
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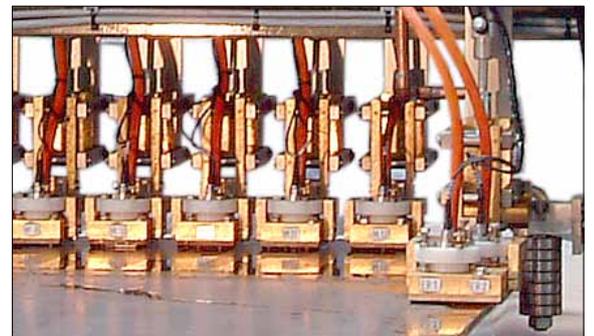


Narrow strips are fed through the inspection system in a centric manner. Only the probes above the strip are then active. The individual probe holders are pneumatically lowered into the test position. The end of the strip or largely damaged zones within the strip are automatically detected and the probes are lifted into the safety position.

System calibration:
A separate calibration stand is provided. The testing mechanics can be moved offline above a calibration plate carrying artificial defects (notches and flat bottom holes). This photograph shows a testing system with oscillating probes for a coverage of the strip middle of 40%. The maximum strip width was 2050 mm and a total of 37 probes was used.



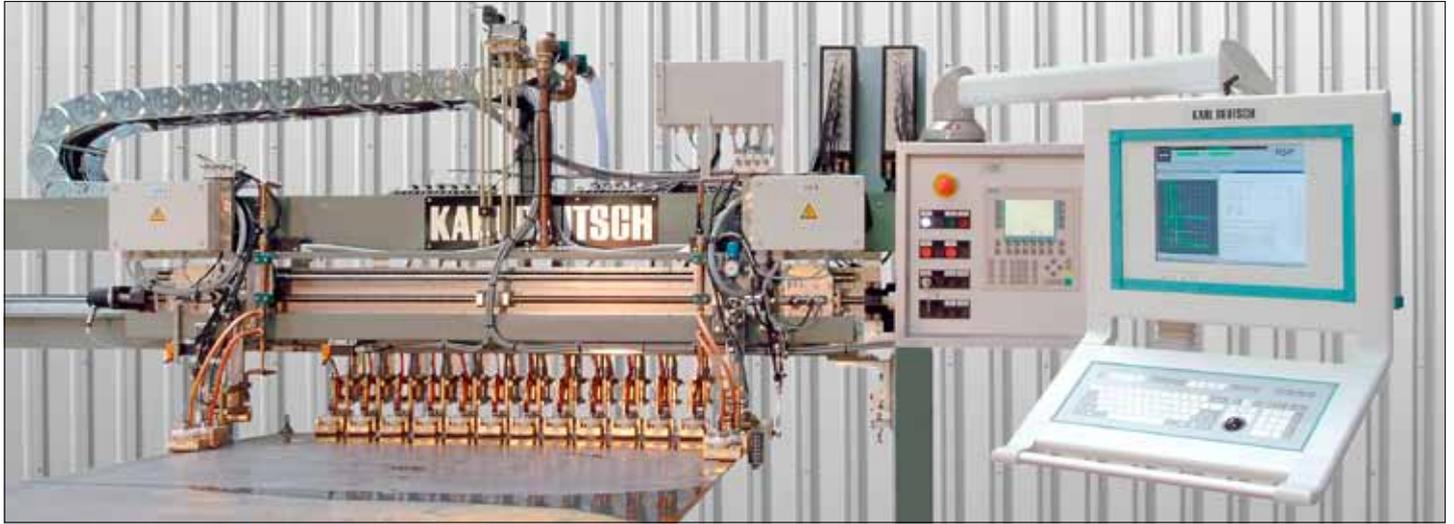
Probe holders for the strip middle: Hardened skids guide the gimble-mounted probes along the strip surface.



The strip edges are separately inspected with a test trace between 25 mm and 50 mm. Rollers which are pneumatically guided along the strip edge allow a precise positioning of the probes. 100% of the strip edge is covered.

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ECHOGRAPH-BAPS Ultrasonic Strip Inspection System with two operator panels, one for the electrical control (PLC) and one for the ultrasonic testing electronics.

Summary of the technical data:

Strips

Material	cold- or hot-rolled strips
Width of strip (b)	100 - 4000 mm
Strip thickness (d)	4 - 40 mm
Waviness	max. \pm 20 mm for a length of 2 m
Surface condition	as rolled without loose scale
Temperature	5 - 45 °C
Strip edges	both edges machined
Detectable flaws	3 - 6 FBH, dependent on probe type and specification

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